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मानक

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IS/ISO 105-A06 (1995): Textiles - Tests for Colour fastness
: Part A06 Instrumental determination 1/1 standard depth of
colour [TXD 5: Chemical Methods of Test]



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Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

वस्त्रादि — रंग के पक्केपन के परीक्षण

भाग ए06 उपकरण द्वारा रंग की 1/1 स्टैंडर्ड डैप्थ को ज्ञात करना

Indian Standard

TEXTILES — TESTS FOR COLOUR FASTNESS

**PART A06 INSTRUMENTAL DETERMINATION OF
1/1 STANDARD DEPTH OF COLOUR**

ICS 677.016.47 : 620.191.73.05

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BUREAU OF INDIAN STANDARDS
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NATIONAL FOREWORD

This Indian Standard (Part A06) which is identical with ISO 105-A06 : 1995 'Textiles — Tests for colour fastness — Part A06 : Instrumental determination of 1/1 standard depth of colour' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Chemical Methods of Test Sectional Committee and approval of the Textile Division Council.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to the following International Standard for which Indian Standard also exists. The corresponding Indian Standard which is to be substituted in its place is listed below along with its degree of equivalence for the edition indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 105-J03 : 1995 Textiles — Tests for colour fastness — Part J03 : Calculation of colour difference	IS 15098 : 2002 Textiles — Method for determination of colour fastness : Method for calculation of colour difference	Technically Equivalent

The composition of Technical Committee responsible for the preparation of this standard is given in National Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

TEXTILES — TESTS FOR COLOUR FASTNESS

PART A06 INSTRUMENTAL DETERMINATION OF 1/1 STANDARD DEPTH OF COLOUR

1 Scope

This method is intended for determining 1/1 standard depth of a dyeing on any textile material by a colorimetric method as a permitted alternative to the visual method described in clause 12 of ISO 105-A01:1994.

This method is applicable to 1/1 standard depth of colour only. Its use for other standard depths is under consideration.

NOTE 1 Specimens which this colorimetric method indicate to be of 1/1 standard depth may differ from specimens which are visually assessed to be of 1/1 standard depth by comparison with physical standards known to be of 1/1 standard depth. These differences may lead to differences in the results of tests applied subsequently. It is recommended that the method of assessment of 1/1 standard depth, i.e. ISO 105-A06 or visual, be included in the report of tests subsequently applied.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 105. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 105 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

CIE Publication No. 15.2:1986, *Colorimetry*, (second edition).¹⁾

3 Principle

The CIELAB colour coordinates L^* (lightness), C^*_{ab} (chroma) and h_{ab} (hue) of the dyeing to be checked for 1/1 standard depth are measured instrumentally. The lightness L_{SD} for 1/1 standard depth is calculated by means of a given equation. The lightness difference ΔL between the measured lightness L^* of the dyeing and the calculated lightness L_{SD} required for 1/1 standard depth is determined to decide if the dyeing represents 1/1 standard depth.

4 Apparatus

4.1 Spectrophotometer or colorimeter, meeting any one of the definitions described in CIE publication 15.2, subclause 1.4.

5 Test specimen

Cut a representative specimen of the dyeing to be checked for 1/1 standard depth and mount it on an opaque white backing which has not been pretreated with a fluorescent whitening agent. The size of the specimen shall fit at least the aperture of the instrument to be used for measurement. A minimal specimen size of 50 mm × 50 mm is recommended.

When presented to the instrument, the specimen shall be of sufficient thickness to be opaque, otherwise light will pass through the specimen and reflect off the backing material. Check the opacity of the specimen by measuring it over a black background and separately over a white background. If complete opacity cannot be achieved, then it is sufficient if the

1) Available from the Central Bureau of the CIE, Kegelgasse 27, A-1030 Vienna, Austria.

difference between the L^* resulting from measurements over black and white backgrounds is less than 0,2.

6 Procedure

Place the test specimen against the sample port of the instrument in such a way that it provides a smooth surface and read the CIELAB coordinates L^* (lightness), C^*_{ab} (chroma) and h_{ab} (hue), using the CIE 10° observer and illuminant D65. Take at least two readings, preferably from different areas of the test specimen, and average them.

7 Calculation

7.1 Calculate the lightness L_{SD} required for 1/1 standard depth using the equation:

$$L_{SD} = 20,4 + C \cdot P + 6[\exp(-C \cdot P/6)]$$

where

$$C = C^*_{ab}$$

$$P = \sum_{m=0}^3 K_{n,m} (h_{ab} - h_n)^m \quad \text{for } h_n \leq h_{ab} < h_{n+1}$$

in which

h_n are the limiting angles of the different colour sectors in the CIELAB colour diagram, for $n = 1$ to 9;

$K_{n,m}$ are the coefficients of the polynomial P , for $m = 0$ to 3.

h_n and $K_{n,m}$ are listed in table 1.

7.2 Calculate the lightness difference between the measured and calculated values: $\Delta L = L^* - L_{SD}$. If ΔL is not more than $\pm 0,5$, the specimen represents 1/1 standard depth of colour.

7.3 Typical data which may be used to verify a computer program for direct calculation of ΔL are given in annex A. Annex B suggests corrective action if the test specimen does not adequately represent 1/1 standard depth.

8 Test report

The test report shall include the following information:

- a) the number and year of publication of this part of ISO 105; i.e. ISO 105-A06:1995;
- b) all details necessary for complete identification of the sample tested;
- c) identification of the spectrophotometer or colorimeter used, including the CIE geometry type selected;
- d) the value of ΔL calculated for the sample (see 7.2);
- e) the test date.

Table 1 — Limiting angles h_n and coefficients $K_{n,m}$ of the polynomial P

n	h_n	$K_{n,0}$	$K_{n,1}$	$K_{n,2}$	$K_{n,3}$
1	0	$3,27 \times 10^{-1}$	$1,73 \times 10^{-3}$	$-2,13 \times 10^{-5}$	$8,68 \times 10^{-7}$
2	52	$4,81 \times 10^{-1}$	$6,57 \times 10^{-3}$	$1,14 \times 10^{-4}$	$-3,50 \times 10^{-6}$
3	79	$6,73 \times 10^{-1}$	$5,08 \times 10^{-3}$	$-1,69 \times 10^{-4}$	$1,07 \times 10^{-6}$
4	135	$6,14 \times 10^{-1}$	$-3,83 \times 10^{-3}$	$1,02 \times 10^{-5}$	$6,40 \times 10^{-8}$
5	203	$4,21 \times 10^{-1}$	$-1,56 \times 10^{-3}$	$2,32 \times 10^{-5}$	$-4,82 \times 10^{-7}$
6	267	$2,90 \times 10^{-1}$	$-4,51 \times 10^{-3}$	$-6,93 \times 10^{-5}$	$2,43 \times 10^{-6}$
7	302	$1,51 \times 10^{-1}$	$-4,40 \times 10^{-4}$	$1,85 \times 10^{-4}$	$-2,30 \times 10^{-6}$
8	340	$2,76 \times 10^{-1}$	$3,69 \times 10^{-3}$	$-7,66 \times 10^{-5}$	$9,22 \times 10^{-7}$
9	360	$3,27 \times 10^{-1}$	$1,73 \times 10^{-3}$	$-2,13 \times 10^{-5}$	$8,68 \times 10^{-7}$

Annex A
(informative)

Representative test data

To help check computer programs giving ΔL values directly from measured colour coordinates of the test specimen, some representative test data are given in table A.1.

Table A.1 — Test data for computer program check of ΔL calculation

L^*	C^*_{ab}	h_{ab}	ΔL
30,0	20,0	0,0	+ 1,043
30,0	20,0	1,0	+ 1,020
30,0	20,0	180,0	– 1,023
30,0	20,0	359,0	+ 1,072

Annex B

(informative)

Corrective action

If the lightness difference ΔL is greater than $\pm 0,5$, the test specimen does not adequately represent 1/1 standard depth. A fresh dyeing should be made using a lower concentration of dye if ΔL is negative, or a higher concentration of dye if ΔL is positive.

NATIONAL ANNEX A

(National Foreword)

COMMITTEE COMPOSITION

Chemical Methods of Test Sectional Committee, TX 05

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